and lighter particles rise in the water, and can either be poured off or dipped out with a pipette, leaving most of the sand behind.

The material so obtained is called "waterwashed," as no acids are used, and almost the whole treatment is with pure water alone.

For perfect cleaning of the material Dr. Taylor furnishes the following directions:

CLEANING DIATOMS FROM MARINE MUDS.

DR. GEO. H. TAYLOR'S PROCESS.

A quantity of the mud found to contain diatoms is placed in a large jar, which is then filled with clean water, thoroughly shaken, and allowed to settle for ten minutes. One-half is then poured off into another jar, the first refilled, shaken up, and again allowed to settle for ten minutes when the top portion is poured off into a third jar. The heavier material in the first jar is now washed several times by filling the jar with clean water, thoroughly shaking, settling for ten minutes and pouring off the top portion into the third jar. This process is continued with the first jar until the water is clear after settling for ten minutes. The material is then taken from the first jar in small quantities and "sanded" by placing each portion in a shallow dish with a moderate quantity of water, and rotating the dish so as to cause a vortex in the water, when the diatoms and lighter matter will rise in the water and can be poured off into a quart bottle, leaving the sand and heavier particles behind. This process is repeated with each portion until only sand is left in the dish, which sand is, of course, thrown away. The "sanded" material accumulated in the quart bottle is now placed in an evaporating dish, holding at least half a pint, and dried. When dry, nitric acid is poured upon it in liberal quantity, and it is boiled until fumes cease to appear, when a few grains of bichromate of potash are dropped in, and after boiling a few minutes more the dish and its contents are allowed to cool. When cool, pour off the acid and refill the dish with sulphuric acid; boil this thoroughly, and finally add a little bichromate of potash. It is better to pour off the acid and add fresh, at least once during the boiling, or to drop in a quantity of fresh acid several times during the boiling, which can scarcely be too prolonged. When the sul-

phuric acid has thoroughly cooled it is poured off, but *not into water*, and the material in the dish is washed two or three times with clean water, stirring it up well on the addition of each supply, and allowing it to settle each time before decanting. It is now again sanded by rotating the dish and pouring off the top portion of the fluid into the quart bottle, adding more water each time, until only sand is left in the dish. The material in the bottle, now rich in diatoms, is shaken up, allowed to settle and the water poured off, until every trace of acid is removed, when the material is returned to the clean evaporating dish which is nearly filled with water, placed over the lamp and the water brought to a boil. A very small piece, not over one-half inch in length, of caustic potash, is now added and the boiling continued for two or three minutes (too long boiling will destroy the diatoms), when the contents of the dish are poured into the quart bottle, which is kept ready about half filled with cold water. The material is now again washed by shaking, settling for five minutes, and pouring off most of the water, repeating the operation with fresh quantities of clean water and decreasing the period of settling to two or three minutes, until the water is free from any trace of alkali. The material is now again sanded in small quantities at a time in one of the square convex glasses used for photochrome pictures, by gently agitating and rotating the glass and drawing of the lighter portion from one corner of the glass by means of a dropping tube. The material withdrawn is dropped into a small vial and contains almost all the diatoms; sand and vegetable silica only remaining in the glass at the last. Fresh water is added frequently to replace what is withdrawn.

When all the material has been through this process and is accumulated in the small vial, it is, although vastly reduced in bulk, extremely rich, containing but little sand and a small amount of vegetable silica. It would be considered by most persons well-cleaned material, but a little more time and labor will greatly improve it. Wash the material several times in *distilled* water if it can be had, if not, in filtered rain water, or the purest water to be obtained. And great care must now be used to exclude floating fibers and dust; about five or seven minutes should be allowed for settling. Add now about twenty drops of ammonia, shake well,

and continue the washing as before. It is better to wash ten times than only two or three times, as each shaking loosens a kind of flocculent matter which comes away in the washings. Another sanding in a smaller convex glass with distilled water will improve the material, and if persisted in will give you entirely pure diatoms free from foreign matter or sand. Care should be used not to overlook and throw away the large forms of diatoms which often adhere obstinately to the glass. Frequent examination of samples will direct the steps of the process and show when a perfect result is obtained. The material in jars 2 and 3 can be put through the same process and will yield smaller forms. The sand and large diatoms which cannot be separated from it by the above process may also be saved and the diatoms picked out separately under a lens or by means of a mechanical finger. Only unlimited patience will ensure the best results.

LIST OF MOBILE BAY DIATOMS.

By J. D. Cox, LL. D., Cincinnati, O.

Actinocyclus Ehrenbergii, Ralfs.
" fuscus, Norman (*dubius* Grunow).
Actinoptychus undulatus, Ehr.
" areolatus, Ehr.
" splendens, Ralfs.
" trifoliatus, McNeill, N. Sp.*
Amphora proteus, Gregory.
" Clevei, Grunow.
" cingulata, Cleve.
" obtusa, Greg. and H. L. Sm.
Amphiprora elegans, W. Sm.
" vitrea, W. Sm.
Amphiprora costata.
" alata, Kutz'g.
" lepidoptera, Greg.
Asteromphalus Brookii, Bailey.
Auliscus sculptus, Ralfs.
" cælatus, Bailey.
" pruinosus, Bailey.
Auliscus radiatus, Bailey.
" punctatus, Bailey.
Amphitetras antediluviana, Ehr.
Bacteriastrum curvatum, Shadbolt.
Biddulphia rhombus, W. Sm.
" Baileyi, W. Sm.

* This new species described by Mr. W. S. McNeill of Mobile, I have found in the Richmond and Petersburg fossil deposits, and have been informed by Mr. C. L. Peticolas, of Richmond, that he has found and noted it in the same earth. Mr. McNeill describes and figures it as follows: Disc considerably convex, with three depressions, broadly heart-shaped, shallow, like a broad trefoil; opposite each of the narrower ridges separating the trefoil leaves is a spine within the rim of the disc. Aerolation sub-hexagonal or irregularly reticulate with finer system of regular punctæ, similar to that of the more finely marked *Actinoptychus areolatus*, Ehr. Hoop hyaline—the trefoil leaves not bounded by sharp depression, but passing into the intervening ridges by very gradual curve.